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Abstract

SOME DEVELOPMENT WORK DONE AT EUROCHEMIC

by

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The Eurochemic Research Department has been simultaneously working on the chemical and technological problems involved for the future operation of the Mol plant and several studies on new processes applicable in the field of aqueous reprocessing for irradiated nuclear fuels.

This paper reviews some aspects of the programme.

From the technological aspect, various studies on fuel dissolution, operation of extraction pulse columns and evaporation of radioactive solutions have been carried out. Two of these studies are discussed here in some detail : air pulsation of the extraction columns and interface detection by air bubbling.

The purpose of the work on air pulsation has been to increase the operational safety by elimination of the mechanical parts and a reduction in the maintenance requirements. The work on the interface control has shown that the air bubbling system, in continuous organic phase, is perfectly applicable to industrial columns.

[+] One of the joint undertakings of the O.E.C.D. European Nuclear Energy Agency.

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From the chemical aspect, and in parallel to problems directly connected to the plant erection, the use of tertiary amines and quaternary ammonium salts as extraction media, and the dissolution of uranium and thorium carbide - graphite fuels, are more specially considered.

In the field of tertiary amines, a process for plutonium final purification has been developed. It involves extraction of the plutonium by trilaurylamine (TLA) followed by a precipitation, directly from the organic phase, of the plutonium as an oxalate.

The possibility of applying TLA (or other tertiary amines) to achieve, without any reducing agent, the separation of plutonium from uranium is also discussed. This process would also allow the partition of uranium and plutonium and the final purification of the latter to be combined in one cycle.

The substitution of the tertiary amines by quaternary ammonium salt, in particular for plutonium purification, is also discussed. They have the advantage of giving stable complexes with Pu(IV) (soluble in organic solvents) but allow easy back-extraction of the plutonium by using aqueous solutions either slightly acid, neutral or even alkaline.

The studies connected with the processing of graphite fuels have been mainly concerned with elements having uranium or thorium carbide fuels incorporated in complex carbide matrices.

Dry combustion and attack by a molten salt medium have been selected as a first possible step for the reprocessing.